

Observing at the UMBC/JCA telescope

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Here are some instructions for observing with the UMBC/JCA telescope. Read them carefully. In any case: Think before doing something at the telescope! Understand what you are doing and what the purpose of your action is. The equipment is fragile and expensive.

1 Prepare for observation

Before leaving your home, make sure you have the following:

- The right clothing. It is nearly as cold inside the computer room as outside. Sitting long in the cold makes it even worse. Wear steady footwear.
- Bring a thermos bottle with tea or coffee if you feel like - but do not put it or any drinks on the computer desk, nor anywhere near electronic equipment! Something to eat is also not a bad idea.
- Bring a flashlight if you have one
- Be prepared: Do you have the instructions what to do at the telescope? What sidereal time corresponds with what local time (so that you know which objects can be observed when) ? Paper, pen, calculator, observation manual in your bag?
- Do you know when and where to meet, so that you can actually get into the telescope dome? Do you have the necessary telephone numbers with you?

2 Prepare at the telescope

At the telescope there are several things to do before starting.

- Check the weather! Any clouds? In case it is foggy or raining (even a tiny bit of rain), do not open the telescope dome!
- Start up the telescope step-by-step as described in the manual. Check whether or not it is necessary to start up the GAM/TCS computer. Take your time. Make sure you do not miss a step.
- After opening the dome, check upstairs if everything is fine.
- Check the weather again (also frequently during the night). The key code for the door is 34628 (if you open the door without autorisation, an alarm will go off!). Outside: **don't walk away from the dome - there is no fence on the roof!**. Adapt your vision for a moment outside so that you can see the stars.

3 During the observation

- Check the weather frequently - **don't fall off the roof!**
- **keep all lights off in the dome**
- **keep the fire door to the computer room shut all times**
- **keep the door from the computer room to the lecture hall shut all times**
- **Never leave the telescope unattended before you shut it down completely.** Someone has to stay at the telescope (i.e. in the computer room) at all times
- Write all your observations into the observation log (in a way that also someone else would be able to read it).
- Note that at night once you leave the building you cannot get back in
- In case of problems, give me a call: 301 474 0328 or 240 472 6189

4 At the end

- Follow the shut-down instructions step by step
- Make sure that the dome and all doors are closed, mirror is covered, TCS shut down, all lights turned off
- Take everything with you. Do not leave your notes, paper, trash etc.

5 Project description

In the project you will study several Galactic objects and determine physical aspects of them applying the techniques we discussed during the “Stellar Astrophysics” Course.

When starting at the telescope, do the alignment using a bright star from the library, for example library object #401 (δ And). Do also the focus series on this object (i.e. determine at which Focus setting the object appears smallest and most point-like).

Do not forget to take *dome flats* and *darks* (you can do this before or after the other observations). The darks have to have the same exposure time as the observations you did, and you need at least 3 darks per exposure length in order to get good statistics.

Observations of the sky should not be longer than 5 minutes each. In case the object is too faint after 5 minutes, do a second exposure with the same setting (you can combine observations later). On the other hand make sure that the objects you are interested in are not saturated in your exposure. Exposure time in the narrow filters has to be longer than in the broad filters (V, R, B, I). Remember that objects are best observable when their right ascension (RA) is near the sidereal time (S.T.), which you find on the TCS monitor on the left.

The first Galactic object to study is the planetary nebula NGC 6826 at $RA = 19^{\text{h}}44'52''$ and $DEC = +50^{\circ}31'42''$ (J2000.0 coordinates). Take exposures in different filters (R, I, H_{α}). Choose an exposure time long enough that you can actually see the structure of the planetary nebula. In the analysis of the data you will determine the extension of the nebula (at different wavelengths) and estimate the age of the nebula.

The open cluster NGC 884 should be your next object (J2000.0: $RA = 02^{\text{h}}22'26''$, $DEC = +56^{\circ}06'07''$). Take images in the R and I band. Based on these images you will construct a Hertzsprung-Russell diagram for this cluster.

The super nova remnant (SNR) known as the Crab nebula is your next target (J2000.0: $RA = 02^{\text{h}}22'26''$, $DEC = +56^{\circ}06'07''$). Take exposures in different filters (R, I, H_{α}). Choose an exposure time long enough that you can actually see the structure of the SNR. In the analysis of the data you will determine the extension (at different wavelengths) and estimate the age of the SN.

From 22:30 (local time) on you can observe M42 (in case it is still too early, continue first with the next object). M42, the Orion nebula, is a star forming region (J2000.0: $RA = 05^{\text{h}}35'15''$, $DEC = -05^{\circ}23'22''$). Take exposures in all filters available. Choose an exposure time long enough that you can actually see the detailed structure of the star forming region.

M36 is another open cluster (J2000.0: $RA = 05^{\text{h}}35'19''$, $DEC = +34^{\circ}08'00''$). In the later analysis you can decide whether you prefer M36 or NGC 884 for constructing the Hertzsprung-Russell diagram. Take images in the R and I band.